2-10-15

DAKOTA PRAIRIE REFINING, LLC

3815 116th Ave SW
Dickinson, ND 58601
www.DPRefining.com

~~February 10, 2015~~

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Sector Policies & Programs Division
U.S. EPA Mailroom (E143-01)
Attention: Refinery Sector Lead
109 T.W. Alexander Drive
Research Park Triangle, NC 27711
refinerynsps@epa.gov

Dear Refinery Sector lead,

Enclosed is the initial Flare Management Plan (FMP) for the Dakota Prairie Refining, LLC (DPR) refinery in Dickinson, ND. We anticipate initial gas flow to the flare on February 24, 2015 and this FMP is thus submitted as required by 40 CFR 60.103a(b)(1).

The DPR refinery flare is a newly constructed flare as defined by §60.100a as it was constructed after June 24, 2008 as part of the initial refinery construction. An electronic copy of this FMP was e-mailed to refinerynsps@epa.gov as allowed under §60.103a(b)(3) on February 10, 2015.

Jean Butterfield, Environmental Manager, is the FMP contact at our facility and can be reached at 701-456-6913 (work) or 701-690-0316 (cell). Please direct all correspondence to her at the following mailing address:

Dakota Prairie Refining, LLC
3815 116th Avenue SW
Dickinson, ND 58601

Sincerely,

David Podratz 2/10/15
Plant Manager

Dakota Prairie Refining, LLC

NSPS Ja Flare Management Plan (FMP)

February 10, 2015

Dakota Prairie Refining, LLC NSPS Ja Flare Management Plan

February 10, 2015

Contents

List of Tables

List of Appendices

List of Acronyms

API	American Petroleum Institute
ARU	Amine Regeneration Unit
CAA	Corrective Action Analysis
CFR	Code of Federal Regulations
DCS	Distributed Control System
DHT	Distillate Hydrotreating Unit
DPR	Dakota Prairie Refining
EPA	Environmental Protection Agency
FGR	Flare Gas Recovery
FMP	Flare Management Plan
HGU	Hydrogen Generation Unit
LPG	Liquefied Petroleum Gas
NSPS	New Source Performance Standards
NSU	Naphtha Stabilization Unit
PSA	Pressure Swing Adsorption
PSV	Process Safety Valve
PUVF	Pulsed Ultraviolet Fluorescence
RCA	Root Cause Analysis
SCF	Standard Cubic Feet
SCFD	Standard Cubic Feet per Day
SCFH	Standard Cubic Feet per Hour
SRU	Sulfur Recovery Unit
SWS	Sour Water Stripper

Definitions

Terms used in this Flare Management Plan and 40 CFR Part 60 Subpart Ja are defined as follows by §60.101a:

Ancillary equipment means equipment used in conjunction with or that serves a refinery process unit. Ancillary equipment includes, but is not limited to, storage tanks, product loading operations, wastewater treatment systems, steam- or electricity-producing units (including coke gasification units), pressure relief valves, pumps, sampling vents and continuous analyzer vents.

Corrective action means the design, operation and maintenance changes that one takes consistent with good engineering practice to reduce or eliminate the likelihood of the recurrence of the primary cause and any other contributing cause(s) of an event identified by a root cause analysis as having resulted in a discharge of gases to an affected flare in excess of specified thresholds.

Corrective action analysis means a description of all reasonable interim and long-term measures, if any, that are available, and an explanation of why the selected corrective action(s) is/are the best alternative(s), including, but not limited to, considerations of cost effectiveness, technical feasibility, safety and secondary impacts.

Emergency flare means a flare that combusts gas exclusively released as a result of malfunctions (and not startup, shutdown, routine operations or any other cause) on four or fewer occasions in a rolling 365-day period. For purposes of this rule, a flare cannot be categorized as an emergency flare unless it maintains a water seal.

Flare means a combustion device that uses an uncontrolled volume of air to burn gases. The flare includes the foundation, flare tip, structural support, burner, igniter, flare controls, including air injection or steam injection systems, flame arrestors and the flare gas header system. In the case of an interconnected flare gas header system, the flare includes each individual flare serviced by the interconnected flare gas header system and the interconnected flare gas header system.

Flare gas header system means all piping and knockout pots, including those in a sub header system, used to collect and transport gas to a flare either from a process unit or a pressure relief valve from the fuel gas system, regardless of whether or not a flare gas recovery system draws gas from the flare gas header system. The flare gas header system includes piping inside the battery limit of a process unit if the purpose of the piping is to transport gas to a flare or knockout pot that is part of the flare.

Flare gas recovery system means a system of one or more compressors, piping and the associated water seal, rupture disk or similar device used to divert gas from the flare and direct the gas to the fuel gas system or to a fuel gas combustion device.

Fuel gas means any gas which is generated at a petroleum refinery and which is combusted. Fuel gas includes natural gas when the natural gas is combined and combusted in any proportion with a gas generated at a refinery. Fuel gas does not include gases generated by catalytic cracking unit catalyst regenerators, coke calciners (used to make premium grade coke) and fluid coking burners, but does include gases from flexicoking unit gasifiers and other gasifiers. Fuel gas does not include vapors that are collected and combusted in a thermal oxidizer or flare installed to control emissions from wastewater treatment units other than those processing sour water, marine tank vessel loading operations or asphalt processing units (i.e., asphalt blowing stills).

Fuel gas combustion device means any equipment, such as process heaters and boilers, used to combust fuel gas. For the purposes of this subpart, fuel gas combustion device does not include flares or facilities in which gases are combusted to produce sulfur or sulfuric acid.

Fuel gas system means a system of compressors, piping, knockout pots, mix drums, and units used to remove sulfur contaminants from the fuel gas (e.g., amine scrubbers) that collects refinery fuel gas from one or more sources for treatment as necessary prior to combusting in process heaters or boilers. A fuel gas system may have an overpressure vent to a flare but the primary purpose for a fuel gas system is to provide fuel to the refinery.

Non-emergency flare means any flare that is not an emergency flare as defined in this subpart.

Petroleum means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.

Petroleum refinery means any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, asphalt (bitumen) or other products through distillation of petroleum or through redistillation, cracking or reforming of unfinished petroleum derivatives. A facility that produces only oil shale or tar sands-derived crude oil for further processing at a petroleum refinery using only solvent extraction and/or distillation to recover diluent is not a petroleum refinery.

Primary flare means the first flare in a cascaded flare system.

Process upset gas means any gas generated by a petroleum refinery process unit or by ancillary equipment as a result of startup, shutdown, upset or malfunction.

Purge gas means gas introduced between a flare's water seal and a flare's tip to prevent oxygen infiltration (backflow) into the flare tip. For flares with no water seals, the function of purge gas is performed by sweep gas (i.e., flares without water seals do not use purge gas).

Reduced sulfur compounds means hydrogen sulfide (H_2S), carbonyl sulfide, and carbon disulfide.

Refinery process unit means any segment of the petroleum refinery in which a specific processing operation is conducted.

Root cause analysis means an assessment conducted through a process of investigation to determine the primary cause, and any other contributing cause(s), of a discharge of gases in excess of specified thresholds.

Sweep gas means the gas introduced in a flare gas header system to maintain a constant flow of gas to prevent oxygen buildup in the flare header. For flares with no water seals, sweep gas also performs the function of preventing oxygen infiltration (backflow) into the flare tip.

0.0 Introduction

0.1 Summary

Dakota Prairie Refining, LLC (DPR) will begin operation of the refinery west of Dickinson in Stark County, North Dakota in the winter of 2014-2015. DPR is a new refinery which will commence startup of its flare on February 24, 2015. The refinery intends to produce saleable diesel fuels, as well as liquefied petroleum gas (LPG), stabilized naphtha (a gasoline feedstock), and other distillates and gas-oil-based intermediates.

The refinery is comprised of multiple process units designed to convert crude oil gathered from the Bakken formation into refined transportation fuels and other petroleum fuels, products, and intermediates. The process units include crude distillation, naphtha stabilization, hydrotreating, hydrogen generation, a sour water stripper, amine regeneration, sulfur recovery, and supporting utilities.

DPR will operate one flare, referred to as the Refinery Flare. DPR has prepared this Flare Management Plan (FMP) to document actions to minimize gas flow to the flares and meet the work practice standards set forth in 40 CFR Part 60 Subpart Ja - Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007, also known as New Source Performance Standard (NSPS) Ja.

This FMP has been prepared in accordance with 40 CFR §60.103a(a). For the affected flare at DPR this FMP:

- Lists the process units connected to the flare (§60.103a(a)(1))
- Documents DPR's flare minimization efforts (§60.103a(a)(2))
- Describes the flare (§60.103a(a)(3))
- Establishes baseline flow to the flare (§60.103a(a)(4))
    - No alternative baseline flow rates have been determined at this time
- Presents procedures to minimize flaring during startup and shutdown (§60.103a(a)(5))
- Summarizes procedures to reduce flaring due to fuel gas imbalances (§60.103a(a)(6))

DPR does not operate a flare gas recovery system so Section 7, as required by §60.103a(a)(7), describing procedures to minimize flare gas recovery system outages, is not applicable.

The history of and revisions to this FMP are described in Appendix A.

DPR is a new refinery with startup, including the first natural gas flow to the flare for commissioning, expected to commence February 24, 2015. Therefore, this FMP is being submitted to the Environmental Protection Agency (EPA) prior to initial operation of the flare.

0.2 Facility Description

The refinery is comprised of multiple process units designed to process crude oil gathered from the Bakken formation into refined transportation fuels and other petroleum fuels, products, and intermediates. The process units for the proposed refinery are described in sections 0.2.1-0.2.8 below.

0.2.1 Crude Distillation Unit

The crude distillation unit separates the raw crude oil feed into raw products by boiling-range. The main distillation tower in the unit separates the crude oil into various petroleum products and intermediates. The crude distillation unit includes 21 flare connections; 10 process safety valves (PSVs), 10 pump seal connections, and a process vent from the overhead accumulator.

0.2.2 Naphtha Stabilization Unit

The Naphtha Stabilizer Unit (NSU) removes remaining light hydrocarbons from naphtha. Light-end petroleum compounds are removed as LPG product, while the remaining stabilized naphtha is sent via pipeline to a nearby third party facility where it is loaded into rail cars to be sold and further processed at other facilities. The NSU includes 10 flare connections including 8 PSVs, one vent for vessel deinventory on shutdown, and one pump seal connection.

0.2.3 Distillate Hydrotreating Unit

The Distillate Hydrotreating Unit (DHT) removes sulfur and nitrogen contaminants contained in the distillate cuts from the Crude Distillation Unit through reaction with hydrogen over catalyst, resulting in product-grade diesel and kerosene. The DHT includes 18 flare connections.

0.2.4 Hydrogen Generation Unit

The Hydrogen Generation Unit (HGU) produces a pure hydrogen stream for use in the Hydrotreater Unit utilizing a dry natural gas feedstock in the Steam Methane Reformer and a Pressure Swing Adsorption (PSA) system to separate hydrogen from other reaction products (primarily carbon monoxide and carbon dioxide) that are used as fuel. The HGU includes 26 flare connections.

0.2.5 Sour Water Stripper

The Sour Water Stripper (SWS) removes H_2S and NH_3 from sour water sources at the facility. The resultant sour gas is processed at the sulfur recovery unit. The treated water product is used as wash water to the desalter system in the Crude Distillation Unit. The SWS includes three flare connections including two PSVs and one process valve.

0.2.6 Amine Regeneration Unit

An amine compound is used to chemically remove H_2S from product streams. The Amine Regeneration Unit (ARU) removes H_2S from the "rich" sulfur-laden amine, so that the resultant "lean" amine can then be recycled into the process units for continuous sulfur removal. The H_2S removed from the amine are processed at the Sulfur Recovery Unit (SRU). The ARU includes three flare connections including two PSVs and one process valve.

0.2.7 Sulfur Recovery Unit

The Sulfur Recovery Unit process the H_2S removed from the sour water stripper gas, amine acid gas, and distillate hydrotreater stripper gas streams. The refinery will use a Claus unit that converts H_2S to a sulfur product which is loaded out for sale. The SRU does not have its own flare; flare gases from this unit are routed to the refinery flare. The SRU includes seven flare connections including four PSVs, two pump seal connections, and a natural gas sweep.

0.2.8 Utilities

The refinery includes three identically designed boilers to provide process steam for normal operations and during turnarounds and emergency events when there is a loss of steam that is otherwise generated from excess heat at process units. The refinery also includes a thermal oil heater for use in heat tracing, a diesel-fired emergency fire pump engine, and a natural-gas fired emergency generator. Thermal cooling of process streams is performed by conventional air-cooled and water-cooled heat exchangers. A cooling tower is used to transfer excess process heat in the water to the atmosphere. The refinery operates a refinery flare to safely combust process upset gases during periods of process startups, shutdowns, upsets, malfunctions, and other times as needed. The refinery utilities include eight flare connections including PSVs and sweep gas valves.

0.3 Affected Flares

DPR will operate one flare. The flare is planned to be commissioned on December 20th, 2014 and will be subject to NSPS Ja. The flare does not qualify as an emergency flare, as defined in NSPS Ja, and will thus be monitored for flow, hydrogen sulfide, and total sulfur. The flare details are provided in Section 3.0 below.

1.0 Flare Connections [§60.103a(a)(1)]

DPR operates one flare. The flare has several process and emergency connections. A list of all flare connections including refinery process units, ancillary equipment, and fuel gas system connected to the affected flare as required by §60.103a(a)(1) is included in Appendix B. Maps of the flare header and subheaders are included in Appendix C. It is important to note that ancillary equipment, as defined by §60.101a, includes, but is not limited to equipment at DPR including, if applicable, storage tanks, product loading operations, wastewater treatment systems, pressure relief valves, pumps, sampling vents, and continuous analyzer vents.

2.0 Flare Minimization [§60.103a(a)(2)]

§60.103a(a)(2) requires an assessment of whether discharges to affected flares from process units, ancillary equipment, and fuel gas systems can be minimized. The flare minimization assessment must (at a minimum) consider the following:

- Elimination of process gas discharge to the flare through process operating changes or gas recovery at the source.
- Reduction of the volume of process gas to the flare through process operating changes.
- Installation of a flare gas recovery system or, for facilities that are fuel gas rich, a flare gas recovery system and a co-generation unit or combined heat and power unit.
- Minimization of sweep gas flow rates and, for flares with water seals, purge gas flow rates.

The assessment must provide clear rationale in terms of costs (capital and annual operating), natural gas offset credits (if applicable), technical feasibility, secondary environmental impacts and safety considerations for the selected minimization alternative(s) or a statement, with justifications, that flow reduction could not be achieved.

Because DPR is not yet operational, the minimization assessment focused on the anticipated flare contribution of each connection and the potential for minimization. Once the refinery is operational the flare system will be evaluated for further reductions based on observed flare gas volumes. This review will take place within one year after the refinery achieves steady-state operation. This will allow DPR to evaluate actual operational variations, implement initial improvements, and determine seasonal effects on flare gas volumes.

2.1 Flare Minimization Assessment

The flare gas volume has been minimized, primarily, by designing the refinery to operate with low flare gas volumes. Flaring will occur, but will be minimized to the degree possible while preserving personnel and process safety.

Each flare connection has been evaluated to minimize its contribution to the flare. The list of individual connections' minimization assessment is included in Appendix B. Minimization of certain flare connections was considered by type, including process safety valves (PSVs) and pump seals. For these connections, maintenance programs manage the connections for reliability, which also minimizes their flare contributions. There are no individual differences between connections of these types regarding flare minimization, therefore it is appropriate to address them collectively. Other connections, such as control valves for regulating vessels' pressure, deinventory vents, and sweep gas valves were analyzed individually.

Flare gas minimization efforts for planned startups and shutdowns are discussed in Section 5 below. Minimization efforts for fuel gas imbalance scenarios are discussed in Section 6.

Flare gas recovery (FGR) was evaluated and determined not to be a feasible flare reduction tool at DPR at this time. The primary reason FGR is not feasible is that a lack of regular flare vent gas, there are no anticipated constant flare contributors other than natural gas sweeps, would require nearly full compressed gas recycle and natural gas make-up for operation of FGR compressors. Based on anticipated flare gas volumes, FGR would thus use more energy than it would recover. As cited in Section 2.0 above, DPR will review flare volumes and minimization opportunities within one year after the refinery achieves steady-state operation. FGR will be considered as an option in this review.

Specific minimization efforts are described in Section 2.2.2 below.

2.2 Flare Minimization Implementation

2.2.1 Past Minimization Efforts

There are no past, pre-NSPS Ja, minimization efforts because DPR is a new facility, constructed after NSPS Ja was finalized on September 12, 2012.

2.2.2 Current Minimization Efforts

The current minimization efforts include actions applied to groups of connections and those applied individually. The connections minimized as groups include PSVs and seal pots. All other connections were assessed individually.

PSVs are safety devices which will relieve to the flare to protect the structural integrity of vessels and lines within the refinery. PSV releases are anticipated to be rare and result only from process upsets. Beyond PSV releases caused by over pressuring, another environmental and flare minimization concern with PSVs is leaks. PSV leaks will be detected using ultrasonic monitoring and flare monitoring for flow and sulfur. Detected leaks will be corrected as quickly as practicable. Key PSVs have isolation valves to allow online maintenance. For PSVs lacking independent isolation, valves have been installed and procedures established to isolate their subsystems.

Pump seals are connected to the flare header to ensure any hydrocarbon seal leaks are controlled rather than released to the atmosphere which would create a potential safety hazard to personnel. Leaks will be prevented to the extent possible by ensuring seals are properly cooled and lubricated during operation. Seals connected to the flare include orifice plates with pressure detection to alert refinery operators of any leaks. Seal leaks will be repaired as soon as practicable. Key pumps have installed spares to allow for online maintenance.

Sweep gas volumes have been minimized by evaluating each of the seven natural gas sweeps individually according to American Petroleum Institute (API) Standard 521 (Pressure-relieving and Depressuring Systems). The sweeps have been set to provide adequate sweep of the flare headers and to prevent oxygen infiltration into the flare stack. The total minimum sweep gas initial flow rate of 700 standard cubic feet per hour (scfh) is driven by preventing oxygen infiltration. There are five sweeps for 6-inch flare subheaders which will initially be set via rotometers at 20 scfh. One sweep, also set by procedure using a rotometer, will be initially set at 100 scfh for a 16" flare subheader. The final sweep, controlled by FV-2720, provides the majority of sweep gas for the main flare header. It will initially be set at approximately 500 scfh and controlled by the refinery's distributed control system (DCS). This valve will automatically reduce flow when vent gas is present to avoid unnecessarily flaring natural gas.

Individual flare connection minimization evaluations are described in Appendix B.

2.2.3 Future Minimization Efforts

Within one year of achieving steady-state operations, flare contributions will be evaluated to determine further minimization opportunities and DPR will consider all options including elimination, reduction, and installation of FGR.

3.0 Description of Affected Flare [§60.103a(a)(3)]

§60.103a(a)(3) requires a description of each affected flare. There is only one flare at DPR and its specifications are included in

Table 3-1 below.

Table 3-1 Flare information requirements

Information Requirement	Refinery Flare	Reference
§60.103a(a)(3)(i) Information Requirements		
Elevated or ground	Elevated	§60.103a(a)(3)(i)(A)
Flare height	185 feet	§60.103a(a)(3)(i)(A)
Type of assist system	Air Assisted	§60.103a(a)(3)(i)(B)
Simple or complex flare tip	Simple	§60.103a(a)(3)(i)(C)
Cascaded flare? (Primary or secondary)	No	§60.103a(a)(3)(i)(D)
Backup flare?	No	§60.103a(a)(3)(i)I
Emergency flare?	No	§60.103a(a)(3)(i)(F)
Flare gas recovery system?	No	§60.103a(a)(3)(i)(G)
§60.103a(a)(3)(ii) Information Requirements		
Flare tip date installed	October 8th, 2014	§60.103a(a)(3)(ii)
Flare tip manufacturer	Flare Industries (Aereon)	§60.103a(a)(3)(ii)
Flare tip nominal diameter	42 inches	§60.103a(a)(3)(ii)
Flare tip effective diameter	28 inches	§60.103a(a)(3)(ii)
§60.103a(a)(3)(iii) Information Requirements		
Maximum vent gas flow rate	277,204 pph	§60.103a(a)(3)(iii)
Minimum sweep gas flow rate	700 scfh *(The Refinery Flare does not have a water seal and sweep gas thus also serves as purge gas to prevent oxygen infiltration into the flare stack. This minimum reflects its dual purpose.)*	§60.103a(a)(3)(iii)
Minimum purge gas flow rate	Not Applicable *(The Refinery Flare does not have a water seal and therefore cannot have purge gas per the definition. The function of purge gas is served by the sweep gas.)*	§60.103a(a)(3)(iii)

Information Requirement	Refinery Flare	Reference
Maximum pilot gas flow rate	195 scfh	§60.103a(a)(3)(iii)
Minimum total steam flow rate (if steam-assisted)	Not Applicable (Air Assisted)	§60.103a(a)(3)(iii)
§60.103a(a)(3)(iv) Information Requirements		
Purge gas type	Not Applicable	§60.103a(a)(3)(iv)
Sweep gas type	Natural Gas	§60.103a(a)(3)(iv)
Supplemental gas type	Natural Gas	§60.103a(a)(3)(iv)
Pilot gas type	Natural Gas	§60.103a(a)(3)(iv)
See flare monitor information as required by §60.103a(a)(3)(v) below in Section 3.3		
§60.103a(a)(3)(vi) Information Requirements (For emergency flares, secondary flares, and flares equipped with a flare gas recovery system designed, sized and operated to capture all flows except those resulting from startup, shutdown, or malfunction)		
Water seal description including the operating range for the liquid level	Not Applicable	§60.103a(a)(3)(vi)(A)
Monitoring option elected	Not Applicable	§60.103a(a)(3)(vi)(B)
§60.103a(a)(3)(vii) Information Requirements (For flares equipped with a flare gas recovery system) is not applicable		

3.1 Flare Flow Diagram

§60.103a(a)(3)(ii) requires a description and simple flow diagram showing the interconnection of the following components of the flare: flare tip (date installed, manufacturer, nominal and effective tip diameter, tip drawing); knockout or surge drum(s) or pot(s) (including dimensions and design capacities); flare header(s) and sub header(s); assist system; and ignition system.

The DPR Refinery Flare consists of the following elements:

- Flare Tip
    - Installed October 8th, 2014
    - Manufacturer: Flare Industries (Aereon)

- Nominal Diameter: 42"
- Effective Diameter: 28"
- The detailed flare tip drawing is proprietary to the manufacturer. An overview of the flare tip is included as part of drawing PD-2432 in Appendix C.

- Knockout Drum
  - There is one flare knockout drum for the Refinery Flare, V-2401:
    - Diameter and T/T: 102" I.D. and 348"
    - Design Pressure/Temperature: 50 psig at 500°F; full vacuum at 350°F
- Flare Headers and Sub-Headers
  - The main flare header connects three sub-headers to the flare. Most flare connections vent directly to the main header with all other connections venting via the sub-headers.
  - There are three flare sub-headers:
    - Amine sub-header
    - SRU sub-header
    - HGU sub-header
  - The main flare header is shown on drawings PD-2427 and PD-2428 in Appendix C.
  - The three sub-headers are shown on drawing PD-2427 in Appendix C.
- Assist System
  - The Refinery Flare is air-assisted
  - The air-assist system is shown on drawing PD-2432 in Appendix C.
- Ignition System
  - The ignition system is shown on drawing PD-2432 in Appendix C.

3.2 Flare Gas Line Flow Diagram

§60.103a(a)(3)(iv) requires a description and simple process flow diagram showing all gas lines (including flare, purge (if applicable), sweep, supplemental and pilot gas) that are associated with the flare. For purge, sweep, supplemental and pilot gas, the refinery must identify the type of gas used. The refinery must designate which lines are exempt from sulfur, H_2S or flow monitoring and why (e.g., natural gas, inherently low sulfur, pilot gas), and designate which lines are monitored and identify on the process flow diagram the location and type of each monitor.

Drawing PD-2432 in Appendix C shows all gas lines associated with the flare. The sweep (which also serves as purge), supplemental, and pilot gas are all natural gas and thus exempt from monitoring.

Vented flare gas will be monitored using the instruments described in Section 3.3 below.

3.3 Instrumentation Specifications

The refinery flare is monitored by an optical flow meter, gas chromatograph H_2S analyzer, and pulsed ultraviolet fluorescence total sulfur analyzer. The instrument details are in Sections 3.3.1-3 below.

3.3.1 Flare Flow Measurement

3.3.1.1 Flare Flow Instrumentation Specifications

- Make: Optical Scientific Inc.
- Model: OFS 2000W
- Type: Optical Scintillation
- Range: 0.1 to 40 m/s velocity
- Accuracy: 2% of reading
- Precision: 1% of reading

3.3.1.2 Flare Flow Instrumentation Calibration

The OFS 2000W conducts a self-calibration once per day with an option for additional, manually-initiated calibration checks. Additionally, the instrument conducts continuous monitoring of sensor status including power supply voltage checks, performance checks, and optics contamination.

3.3.1.3 Flare Flow Instrumentation Maintenance Procedures

The manufacturer's recommended preventative maintenance procedures include the following:

Table 3-2 OFS 2000W Flow Monitor Manufacturer's Recommended Maintenance

Task	Monthly	Biannually
Record the information displayed on the controller monthly in a dedicated PM log book for the meter.	X	
Installation condition check: • Inspect the TX Head, RX Head, and Control Box for proper installation. • Verify that all mounting bolts are installed and secure. • Verify that the TX/RX Head mounting gaskets are installed, in good condition, and not leaking air. • Check the power and signal cables to verify that they are tight and not frayed.		X
See that the purge air (if applied) is flowing properly.		X
Check the aim		X
Visual indicator check – Verify that the LED indicators are illuminated per the "Visual Indicators" check section above.		X
Window fouling check – Using the Control Box digital display, verify that the A & B voltages are >0.5 volts or have not decreased significantly from the last PM check. If less than 0.5 volt, follow the steps in Section 9.2.1 "Window Cleaning Procedure" of the operating manual.		X

In addition to the manufacturer's recommendations, at least quarterly, a visual inspection will be conducted of the all components of the monitor for physical and operational integrity and all electrical connections for oxidation and galvanic corrosion per §60.107a(f)(1)(iv).

3.3.1.4 Flare Flow Instrumentation QA Procedures

The OFS 2000W flow monitor will be managed according to §60.107a(f) including the following:

- The flow monitor will be installed, calibrated, operated, and maintained according to the manufacturer's procedures and specifications. [§60.107a(f)(1)]
- The monitor is located in a position that provides a representative measurement of the total gas flow rate. [§60.107a(f)(1)(i)]
- The flow sensor's sensitivity of 2% of reading is within 5% of the flow rate. [§60.107a(f)(1)(ii)]
- The flow monitor is maintainable online, is able to continuously correct for temperature and pressure and is able to record flow in standard conditions. [§60.107a(f)(1)(iii)]

- At least quarterly, a visual inspection will be conducted of the all components of the monitor for physical and operational integrity and all electrical connections for oxidation and galvanic corrosion. [§60.107a(f)(1)(iv)]

3.3.2 Flare H_2S Measurement

3.3.2.1 H_2S Instrumentation Specifications

- Make: ABB
- Model: PGC 5000B
- Type: Gas Chromatograph
- Range: 0-300 ppm
- The accuracy and precision of the PGC 5000B Gas Chromatograph are not available according to ABB. This is due to variations in the measured gas due to which ABB cannot determine how non-H_2S components will affect accuracy and precision.

3.3.2.2 H_2S Instrumentation Calibration

The Allen Bradley PGC 5000B will be validated daily as specified in Table 3-3 below.

Table 3-3 H_2S Instrumentation Daily Calibration Drift Parameters

Calibration Point	Gases	Calibration Drift Range (%)	Calibration Drift Range	Target Calibration Gas Concentration
Zero	H_2S	0-20%	0-60 ppm	30 ppm
Span	H_2S	50-100%	150-300 ppm	270 ppm

Additional calibration practices are specified within the DPR CEMS QAQC Plan.

3.3.2.3 H_2S Instrumentation Maintenance Procedures

The Allen Bradley PGC 5000B will be maintained consistent with the manufacturer's recommendations and as specified in the CEMS QAQC Plan. If there are additional maintenance tasks determined to improve reliability based on actual operation, they will be added to the system's scheduled preventative maintenance. The full maintenance procedures are specified in the DPR CEMS QAQC Plan.

The minimum manufacturer's maintenance recommendations include the following:

Table 3-4 ABB PGC5000B Manufacturer's Recommended Maintenance

Task	Monthly	Quarterly
Perform a visual inspection of the analyzer and sample system check: i. Instrument air supply ii. Sample system flows and pressure iii. Cylinder gas pressures; replace as necessary	X	
Verify calibration and calibrate as necessary. Compare resultant chromatograms with those in the Data Package. Check/set analytical flows and pressures as necessary per the factory Data Package.	X	
Clean sample cell and check carrier line dryers; change as necessary to prevent pressure drop.	X	X
Check all filters; clean or replace as necessary.		X
Inspect analytical valves for wear and proper operation; repair as necessary.		X
Check physical condition of analyzer for corrosion, rust, etc. Take corrective action as necessary		X

3.3.2.4 H_2S Instrumentation QA Procedures

The H_2S instrumentation will be managed by QA procedures as specified in §60.107a and, by reference, 40 CFR 60 Appendices B and F, and detailed in the DPR CEMS QAQC Plan. These procedures include, but are not limited to, the following:

- Perform daily calibration drift checks
- Conduct CEMS corrective actions based on drift specifications
- Conduct annual Relative Accuracy Test Audit (RATA)
- Conduct quarterly Cylinder Gas Audits (CGA)

3.3.3 Flare Total Sulfur Measurement

3.3.3.1 Total Sulfur Instrumentation Specifications

- Make: Thermo Fischer
- Model: Thermo Sola II
- Type: Pulsed Ultraviolet Fluorescence
- Range: 0-100%

- Precision:
    - Results from July 31, 2014 Calibration Specifications from Thermo Fischer
    - Measured Precision (MP) = (SD/FS) * 100
        - Where:
            - MP = measured precision
            - SD = standard deviation
            - FS = specified full scale measurement range of measured component or calculated value
    - Low Range (0-10,000 ppm S (v/v))
        - Stability: 0.08% MP
        - Linearity: 0.04% MP
    - High Range (0-1,000,00 ppm S (v/v))
        - Stability: 0.06% MP
        - Linearity: 0.05% MP
- Accuracy: +/- 1% of full scale

3.3.3.2 Total Sulfur Instrumentation Calibration

The Thermo Sola II will be calibrated as specified in Table 3-5 below.

Table 3-5 Total Sulfur Instrumentation Calibration Parameters

Calibration Point	Gases	Calibration Drift Range (%)	Calibration Drift Range	Target Calibration Gas Concentration
Zero	Total Sulfur Low Range	0-20%	0-10,000 ppm	1,500 ppm
	Total Sulfur High Range	0-20%	0-1,000,000 ppm	150,000 ppm
Span	Total Sulfur Low Range	50-100%	5,000-10,000 ppm	8,500 ppm
	Total Sulfur High Range	50-100%	50%-100%	52%

3.3.3.3 Total Sulfur Instrumentation Maintenance Procedures

The Thermo Fischer Sola II will be maintained, at a minimum, per the manufacturer's recommendations. If there are additional maintenance tasks determined to improve reliability based on actual operation, they will be added to the system's scheduled maintenance.

The minimum manufacturer's maintenance recommendations include the following:

Table 3-6 Sola II Manufacturer's Recommended Maintenance

Task	Monthly	Quarterly	Semi-Annual	Annual
Calibrate the analyzer per the User Manual.	X			
Visually inspect and clean the instrument.			X	
Check the instrument flow rates per manufacturer's recommendation.			X	
Replace the injection valve rotor or slider per the User Manual.			X	
Test the instrument for internal leaks per the User Manual.				X
Replace the pyrolyzer heater per the User Manual.				18 Months

3.3.3.4 Total Sulfur Instrumentation QA Procedures

The total sulfur instrumentation will be managed by QA procedures as specified in §60.107a and, by reference, 40 CFR 60 Appendices B and F, and detailed in the DPR CEMS QAQC Plan. These procedures include, but are not limited to, the following:

- Perform daily calibration drift checks
- Conduct CEMS corrective actions based on drift specifications
- Conduct annual Relative Accuracy Test Audit (RATA)
- Conduct quarterly Cylinder Gas Audits (CGA)

4.0 Baseline Flow and Alternative Operating Scenarios [§60.103a(a)(4)]

§60.103a(a)(4) requires an evaluation of the baseline flow to the flare. The baseline flow to the flare must be determined after implementing the minimization assessment in Section 2.0 of this FMP. Baseline flows do not include pilot gas flow or purge gas flow (provided these gas flows remain reasonably constant (i.e., separate flow monitors for these streams are not required). Separate baseline flow rates may be established for different operating conditions provided that the management plan includes:

- A primary baseline flow rate that will be used as the default baseline for all conditions except those specifically delineated in the plan;
- A description of each special condition for which an alternate baseline is established, including the rationale for each alternate baseline, the daily flow for each alternate baseline and the expected duration of the special conditions for each alternate baseline; and
- Procedures to minimize discharges to the affected flare during each special condition, unless procedures are already developed for these cases under Sections 5.0-6.0 of this FMP, as applicable.

4.1 Primary Baseline Flow Rate [§60.103a(a)(4)(i)]

Because the refinery is not yet operating, actual flare gas volumes are not known at this time. Based on the refinery design, the only non-upset gas contributors to the flare are anticipated to be the minimal sweep gases. Though the sweep gas represents a small, known, flare volume, DPR's initial primary baseline flow rate for the purpose of determining the root cause analysis (RCA) trigger will be zero. The refinery will conduct RCAs for each 24 hour period with flare volumes in excess of 500,000 scfd.

Each flare connection has been analyzed for minimization potential, as described in Section 2.0 above, but the actual flare contribution of each connection cannot be determined until the refinery becomes operational. The baseline flow will be evaluated following initial startup when operations have been stabilized and will be adjusted, if necessary, based on observed flare flow rates. When the baseline is reevaluated, an updated FMP will be submitted to the administrator per §60.103a(b)(2).

Per §60.103a(c)(1), a RCA will be conducted for each 24 hour period in which the flare flow exceeds the baseline plus 500,000 scfd. The RCA trigger for the Refinery Flare will thus be 500,000 scfd.

4.2 Alternative Operating Scenarios [§60.103a(a)(4)(ii)]

DPR will identify alternative operating scenarios as prescribed in §60.103a(a)(4)(ii) after initial startup and the stabilization of operations. There are currently no alternative operating scenarios identified that would alter the primary baseline flow rate of zero as cited in Section 4.1 above.

Procedures to minimize flare flow under alternative operating scenarios as prescribed in §60.103a(a)(4)(iii) are thus omitted.

5.0 Startup and Shutdown Flare Minimization Procedures [§60.103a(a)(5)]

§60.103a(a)(5) requires a description of procedures to minimize or eliminate discharges to the flare during the planned startup and shutdown of the refinery process units and ancillary equipment that are connected to the affected flare, together with a schedule for the prompt implementation of any procedures that cannot reasonably be implemented as of the date of the submission of this FMP.

5.1 Implemented Startup and Shutdown Flare Flow Minimization Procedures

Startup and shutdown each provide unique challenges for preventing flaring and specific procedures are thus addressed separately in Sections 5.1.1 and 5.1.2 below.

The primary procedural tool to minimize flaring during startup and shutdown is to consider and control the sequencing and rate of startup and shutdown. In general, flaring will be reduced by conducting startup and shutdown of each process unit gradually versus rapidly. To the extent practicable, startups and shutdowns will be conducted at a rate that reduces flaring. Startup and shutdown of the overall refinery or individual process units planned more than 30 days in advance will be guided by specific plans, established and documented before conducting the startup or shutdown, that consider flare minimization in their sequence and schedules.

All procedures for startup and shutdown of refinery process units begin with the following statement: *"WARNING: In order to minimize flaring, flare minimization will be considered at every step of this procedure per DPR flare management plan"* to ensure the procedures in this section are followed. Because each startup and shutdown is unique due to safety, maintenance, production, and other factors, specific plans, as cited above, will be utilized to manage flare minimization. As these plans are developed according to the procedures in Sections 5.1.1 and 5.1.2 below, flare minimization procedures specific to each unit and applicable to all startup and shutdown scenarios may be identified. If identified, these specific steps will be added to the unit procedures.

§60.103a(d)(3) specifies that, if the discharge from a flare is the result of a planned startup or shutdown of a refinery process unit or ancillary equipment connected to the affected flare and the procedures in Section 5 of this FMP were followed, a RCA and corrective action analysis is not required. However, DPR will evaluate, using a RCA or other means, the flaring due to startup and shutdown. If practicable changes to startup and shutdown procedures are identified to reduce flaring, individual operating procedures and/or Section 5 of this FMP will be updated accordingly.

The following procedures to minimize flaring due to planned startups and shutdowns are based on design information and anticipated operations as assessed prior to initial refinery startup. All procedures will be evaluated and, if necessary, updated after the refinery achieves steady state operation.

5.1.1 Startup Flare Minimization Procedures

The primary causes of flaring during startup are anticipated to be over pressuring of vessels and systems, non-flare off gas routing limitations, and temporary fuel gas imbalances. Vessel over pressuring may be due to inadequate temperature, flow, or pressure control until steady-state operation is established. Non-flare gas routing limitations may be caused by gas using systems, including sour, amine, fuel gas, or other users, not being online or not having the capacity to effectively route gases away from the flare. Temporary fuel gas imbalances may result from fuel gas users not having the capacity to utilize all the fuel gas being generated during startup.

These scenarios will be mitigated, to the extent practicable, using the procedures described in Sections 5.1.1.1-5.1.1.3 below. While these sections proscribe approaches for managing the anticipated primary causes of flaring during planned startups, the overall startup plan will be evaluated for flaring due to these or other factors.

5.1.1.1 Procedures to Minimize Flaring Due to Vessel Over Pressuring During Planned Startup

Flaring due to vessel over pressuring may result from inadequate temperature, flow, or pressure control until a process system achieves steady-state operation. Over pressuring may lead to flaring either by activating automatic pressure control systems or lifting PSVs. To minimize vessel over pressuring, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned startup of refinery process units and individual vessels connected to the flare:

1. Assess the risk of over pressuring including expected causes of over pressuring (high temperature, limited effluent flow, excessive influent flow, etc.). This risk must be balanced with safe equipment operation.

2. Determine feasible mitigation measures including startup sequence, startup rate, and other options.

3. Incorporate the risk assessment and mitigation measures into the startup plan.

5.1.1.2 Procedures to Minimize Flaring Due to Gas Routing Limitations During Planned Startup

Flaring due to gas routing limitations may result from the sequence, rate, control, or other factor of startup. To minimize flaring due to gas routing limitations, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned startup of refinery process units and individual vessels connected to the flare:

1. Assess gas routing options for vessels and systems which use the flare as a secondary gas destination.

2. Assess the risk that the primary gas destination will not be capable of accepting the anticipated gas volume due to the rate, sequence, or other aspects of startup.

3. Determine feasible mitigation measures including startup sequence, startup rate, and other options.

4. Incorporate the risk assessment and mitigation measures into the startup plan.

5.1.1.3 Procedures to Minimize Flaring Due to Temporary Fuel Gas Imbalance During Planned Startup

Flaring due to temporary fuel gas imbalance may result from the sequence, rate, control, or other factor of startup. To minimize flaring due to temporary fuel gas imbalance, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned startup of refinery process units and individual vessels connected to the flare:

1. Determine the expected status of the fuel gas system prior to the startup of the affected system or vessel.

2. Determine feasible mitigation measures including startup sequence, startup rate, and other options.

3. Incorporate the risk assessment and mitigation measures into the startup plan.

5.1.2 Shutdown Flare Minimization Procedures

The primary causes of flaring during shutdown are anticipated to mirror the causes during startup, including over pressuring of vessels or systems, non-flare off gas routing limitations, and temporary fuel gas imbalances. Shutdown is anticipated to have additional flare contribution due to equipment deinventorying and inerting.

These scenarios will be mitigated, to the extent practicable, using the procedures described in Sections 5.1.2.1-5.1.2.4 below. While these sections proscribe approaches for managing the anticipated primary causes of flaring during planned shutdowns, the overall shutdown plan must be evaluated for flaring due to these or other factors.

5.1.2.1 Procedures to Minimize Flaring Due to Vessel Over pressuring During Planned Shutdown

Flaring due to vessel over pressuring may result from inadequate temperature, flow, or pressure control. Over pressuring may lead to flaring either by activating automatic pressure control systems or lifting PSVs. To minimize vessel over pressuring, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned shutdown of refinery process units and individual vessels connected to the flare:

1. Assess the risk of over pressuring including expected causes of over pressuring (high temperature, limited effluent flow, excessive influent flow, etc.).

2. Determine feasible mitigation measures including shutdown sequence, shutdown rate, and other options.

3. Incorporate the risk assessment and mitigation measures into the shutdown plan.

5.1.2.2 Procedures to Minimize Flaring Due to Gas Routing Limitations During Planned Shutdown

Flaring due to gas routing limitations may result from the sequence, rate, control, or other factor of shutdown. To minimize flaring due to gas routing limitations, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned shutdown of refinery process units and individual vessels connected to the flare:

1. Assess gas routing options for vessels and systems which use the flare as a secondary gas destination.
2. Assess the risk that the primary gas destination will not be capable of accepting the anticipated gas volume due to the rate, sequence, or other aspects of shutdown.
3. Determine feasible mitigation measures including shutdown sequence, shutdown rate, and other options.
4. Incorporate the risk assessment and mitigation measures into the shutdown plan.

5.1.2.3 Procedures to Minimize Flaring Due to Temporary Fuel Gas Imbalance During Planned Shutdown

Flaring due to temporary fuel gas imbalance may result from the sequence, rate, control, or other factor of shutdown. To minimize flaring due to temporary fuel gas imbalance, the following steps, in conjunction with the unit's operating procedure, will be taken prior to and during the planned shutdown of refinery process units and individual vessels connected to the flare:

1. Determine the expected status of the fuel gas system prior to the shutdown of the affected system or vessel.
    a. Will the fuel gas system still be online and able to accept fuel gas?
        i. Will the fuel gas system be locked out or otherwise unable to accept fuel gas?
        ii. Will there be enough fuel users online to utilize the expected volume of fuel gas throughout the duration of shutdown, including all fuel sources?
2. Determine feasible mitigation measures including shutdown sequence, shutdown rate, and other options.
3. Incorporate the risk assessment and mitigation measures into the shutdown plan.

5.1.2.4 Procedures to Minimize Flaring Due to Vessel and System Deinventory During Planned Shutdown

Flaring due to vessel and system deinventory during planned shutdown is anticipated to result from final deinventory, when a system or vessel is at a pressure too low to enter the fuel gas or other gas using system, and nitrogen purging or steaming (collectively referred to as inerting). These cases will be addressed using the following steps, in conjunction with the operating procedures for process units and equipment connected to the flare.

1. Determine the pressure at which the vessel, equipment, or system will be required to depressure equipment to the flare; the pressure below which other off gas options will be infeasible.

2. Ensure the shutdown plan includes depressurizing the vessel, equipment, or system to this pressure, or a pressure as close to it as practicable, before entering the flare. Consider shutdown sequence, rate, and other factors in determining the maximum pressure at which the equipment will be depressurized to the flare.

3. Determine if the vessel, equipment, or system will need to be inerted as part of the planned shutdown. If the equipment does not need to be inerted, ensure its state during shutdown is specified in the shutdown plan.

5.2 Planned Startup and Shutdown Flare Flow Minimization Procedures

There are currently no additional startup and shutdown flare flow minimization procedures planned for implementation. The refinery will monitor flaring during startup and shutdown events and make any necessary procedure updates at that time. Per §60.103a(2), this FMP will be updated to reflect procedure changes but will not be resubmitted to the Administrator unless an alternative baseline flow rate is added, the existing baseline flow rate is changed, FGR is installed, or the flare designation or monitoring methods described in §60.107a(g) are changed.

6.0 Fuel Gas Imbalance Flare Minimization Procedures [§60.103a(a)(6)]

§60.103a(a)(6) requires a description of procedures to reduce flaring in cases of fuel gas imbalance (i.e., excess fuel gas for the refinery's energy needs), together with a schedule for the prompt implementation of any procedures that cannot reasonably be implemented as of the date of the submission of this FMP.

6.1 Implemented Fuel Gas Imbalance Flare Flow Minimization Procedures

DPR does not anticipate operating in a fuel long scenario where more fuel gas is produced than can be consumed. Any operating scenario leading to a positive fuel gas imbalance would be temporary. These scenarios, and their rationale, are described below.

DPR anticipates operating in a fuel gas short position during steady-state operations. Under steady-state operations, as designed, the refinery will require approximately 2,500 MMBtu/d of natural gas to sustain operations. This represents approximately half of the projected 5,400 MMBtu/d fuel demand. The balance of the fuel demand will be met by fuel gas produced at the Crude Unit and Distillate Hydrotreating Unit. Fuel consumers include the CDU Charge Furnace, DHT Charge Furnace, DHT Stripper Reboiler, HGU, and steam boilers. (The boilers will primarily run on natural gas but have the ability to use fuel gas, as well.) The CDU Charge Furnace constitutes more than half of the overall fuel gas demand. Shutdown of the CDU Charge Furnace thus represents the greatest potential to lead to a fuel long scenario. When the CDU is down, natural gas supplementation will be reduced or eliminated, thus bringing the refinery back into fuel balance. Additionally, during a CDU shutdown, the CDU will not contribute to the overall refinery fuel load, making shutdown of the CDU very unlikely to produce a fuel-long scenario.

A fuel-long scenario would occur if both the CDU and DHT are shut down. As the primary process units at the refinery, shutdown of these units would quickly result in a full refinery slowdown or shutdown and thus any fuel gas imbalance would be minimal.

During startup, a scenario is anticipated where the HGU begins producing hydrogen prior to the DHT being online. While the overall refinery may not be fuel long on a heating unit basis, the excess hydrogen would require flaring. If the excess hydrogen is not flared, the fuel gas will become hydrogen-rich. This would cause irregular combustion in the fuel gas users, potentially leading to swings and secondary environmental issues. For these reasons, excess hydrogen will be flared. To minimize the flaring of hydrogen on startup, the DHT will be started as soon as practicable after the HGU is operational.

To minimize flaring during any potential fuel gas imbalance, natural gas supplementation of the refinery's fuel system will be reduced in conjunction with any throughput reduction or shutdown of the CDU, DHT, or other refinery process units. Additionally, during a full refinery shutdown, the reduction of natural gas supplementation and the sequence of process unit shutdowns will be coordinated to minimize flaring. The required sequence of events will depend on current operating conditions and will thus be discussed and documented for any shutdown planned at least 30 days in advance, as described in Section 5 above.

In the event of unplanned or emergency shutdowns, natural gas supplementation of the fuel system will be reduced as soon as practicable to minimize the overall flare flow. Operating units will be brought down as required for safety. As the greatest fuel user the CDU's shutdown, paired with a reductions in natural gas supplementation, will reduce the risk of a fuel gas imbalance.

6.2 Planned Fuel Gas Imbalance Flare Flow Minimization Procedures

There are currently no additional fuel gas imbalance flare flow minimization procedures planned for implementation. The refinery will monitor flaring during fuel gas imbalance events and make any necessary procedure updates at that time. Per §60.103a(2), this FMP will be updated to reflect procedure changes but will not be resubmitted to the administrator unless an alternative baseline flow rate is added, the existing baseline flow rate is changed, FGR is installed, the flare designation or monitoring methods described in §60.107a(g) are changed.

7.0 Flare Gas Recovery Outage Reduction Procedures [§60.103a(a)(7)]

The Refinery does not operate a flare gas recovery system. Section 7.0 of this FMP, as required by §60.103a(a)(7) is thus not included.

This section is included as a placeholder should FGR be added in the future.

8.0 Recordkeeping

The purpose of the recordkeeping program is to maintain records that demonstrate conformance with the requirements outlined in this FMP and NSPS Ja for the Refinery Flare. Requirements for NSPS Ja affected facilities other than the Refinery Flare are not included in this section. The records must be in a form suitable and readily available for inspection. All records relating to the FMP requirements must be kept on site for at least 5 years from the date of each occurrence, measurement, maintenance, corrective action, or report. Records required to be maintained as discussed throughout this FMP include:

- Copy of the FMP updated periodically to account for changes in the operation of the flare. [§60.103a(b)(2)]
    - Utilize Table 10-1, "History of Revisions", in Section 10.1 of this plan to track FMP revisions.
    - Utilize Table 10-2, "Changes for next revision", in Section 10.2 of this plan to ensure changes between formal revisions are captured and incorporated into future revisions.
    - Ensure flare maps, connection lists, the minimization assessment, flare diagrams, and text elements of the FMP are updated when changes occur.
- All procedures referenced by this plan. (Operating procedures referenced in this plan do not need to be included in this FMP but do need to be maintained onsite.)
- Records of discharges greater than 500 lb SO_2 or in excess of 500,000 scfd above baseline in any 24-hour period from the Refinery Flare as required by §60.103a(c). The following information shall be recorded no later than 45 days following the end of a discharge exceeding the thresholds:
    - A description of the discharge.
    - The date and time the discharge was first identified and the duration of the discharge.
    - The measured or calculated cumulative quantity of gas discharged over the discharge duration. If the discharge duration exceeds 24 hours, record the discharge quantity for each 24-hour period. For the Refinery Flare, record the measured or calculated cumulative quantity of gas discharged to the flare over the discharge duration. If the discharge duration exceeds 24 hours, record the quantity of gas discharged to the flare for each 24-hour period.
    - For each discharge greater than 500 lb SO_2 in any 24-hour period from the Refinery Flare, the measured total sulfur concentration or both the measured H_2S concentration and the estimated total sulfur concentration in the fuel gas at a representative location in the flare inlet.
    - The steps that the owner or operator took to limit the emissions during the discharge.

- The root cause analysis and corrective action analysis conducted as required in §60.103a(d), including an identification of the affected facility, the date and duration of the discharge, a statement noting whether the discharge resulted from the same root cause(s) identified in a previous analysis and either a description of the recommended corrective action(s) or an explanation of why corrective action is not necessary under §60.103a(e).

- For any corrective action analysis for which corrective actions are required in §60.103a(e), a description of the corrective action(s) completed within the first 45 days following the discharge and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

- For each discharge from the Refinery Flare that is the result of a planned startup or shutdown of a refinery process unit or ancillary equipment connected to the affected flare, a statement that a root cause analysis and corrective action analysis are not necessary because the owner or operator followed the FMP.

9.0 Reporting

Because the Refinery Flare is newly constructed, this FMP must be submitted no later than the date that the flare becomes an affected facility. [§60.103a(b)(1)] This due date is further supported by page 56451 of the final publication of NSPS Ja rule which states:

> *We note that the final rule does not provide a phased compliance schedule for new and reconstructed flares. The final rule requires owners and operators of new and reconstructed flares to meet all the flare requirements, including the short-term 162 ppmv H_2S concentration requirement, upon the effective date of the requirements or upon startup of the affected flare, whichever is later.*

An excess emissions report for any event exceeding the §60.103a(h) 162 ppmv H_2S 3-hour rolling average basis shall be submitted for all periods of excess emissions according to the requirements of §60.7(c) except that the report shall contain the below information:

- The date that the exceedance occurred;
- An explanation of the exceedance;
- Whether the exceedance was concurrent with a startup, shutdown, or malfunction of an affected facility or control system;
- A description of the action taken, if any.
- The information described in §60.108a(c)(6) for all discharges listed in paragraph §60.108a(c)(6).
- For any periods for which monitoring data are not available, any changes made in operation of the emission control system during the period of data unavailability which could affect the ability of the system to meet the applicable emission limit. Operations of the control system and affected facility during periods of data unavailability are to be compared with operation of the control system and affected facility before and following the period of data unavailability.
- A written statement, signed by a responsible official, certifying the accuracy and completeness of the information contained in the report.

10.0 FMP Revision Details

The owner or operator must comply with the plan as submitted. As per §60.107a(b)(2), the plan should be updated periodically to account for changes in the operation of the flare, such as new connections to the flare or the installation of a flare gas recovery system. The FMP needs to be re-submitted to the Administrator only if the owner or operator adds an alternative baseline flow rate, revises an existing baseline as outlined in Section 4.0 of this FMP, installs a flare gas recovery system or is required to change flare designations and monitoring methods as described in §60.107a(g) for certain flares equipped with water seals. The owner or operator must comply with the updated plan as submitted.

All versions of the plan submitted to the Administrator shall also be submitted to the following address:

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Sector Policies and Programs Division
U.S. EPA Mailroom (E143-01)
Attention: Refinery Sector Lead
109 T.W. Alexander Drive
Research Triangle Park, NC 27711

Electronic copies in lieu of hard copies may also be submitted to refinerynsps@epa.gov.

10.1 Revision Summary

Revision details are included in Appendix A.

Table 10-1 History of revisions

Revision	Date	Summary of Changes
1.0	2/10/2015	Initial DPR FMP

10.2 Changes for next revision

These changes have been documented and will be incorporated in the next revision of this plan. Changes are documented here to allow this plan to remain current between major revisions.

Table 10-2 Changes for next revision

FMP Section	Date of Change	Description of Change

Appendix A

Revision Details

Appendix B

Connection List and Minimization Assessment

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
1	Utilities	Natural Gas Header	PSV-2004	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
2	Crude	Seal Pots	P-111A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
3	Crude	Seal Pots	P-108A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
4	Crude	Seal Pots	P-105A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
5	Crude	T-101	PSV-0638	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
6	Crude	T-101	PSV-0655	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
7	Crude	Seal Pots	P-107A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
8	Crude	Seal Pots	P-104A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
9	Crude	Seal Pots	P-102A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
10	Crude	Seal Pots	P-101A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
11	Crude	V-101 Crude Overhead Accumulator	PV-0704B	Process Control Valve	Process upset gas only.	The Crude Overhead Accumulator, V-101, primarily vents to fuel gas and is not expected to regularly vent to the flare. Flaring would be caused by disruptions in the fuel gas system, loss of the compressor, and, potentially, during startup and shutdown. Flaring will be minimized by effectively managing the fuel gas system, conducting preventative maintenance on the compressor, and startup/shutdown sequences.
12	Crude	Seal Pots	P-103A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
13	Crude	Seal Pots	P-106A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
14	Crude	Seal Pots	P-106C	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
15	Crude	E-103	PSV-0260	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
16	Crude	E-110	PSV-0262	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
17	Crude	E-101A/B	PSV-0163	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
18	Crude	E-102	PSV-0140	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
19	Crude	E-109	PSV-0143	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
20	DHT	R-802 Dewaxer Reactor	FO-0640	Manual	Process upset gas only.	This connection is used only for final depressuring of the vessel during shutdown. No reduction is possible.
21	DHT	Seal Flush	P-801A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
22	DHT	V-803 Stripper Overhead Accumulator	PV-1302A	Process Control Valve	Process upset gas only.	The Stripper Overhead Accumulator, V-803, primarily vents to the sour gas system and is not expected to regularly vent to the flare. Flaring would be caused by process upsets at the SRU. Flaring will be minimized by effectively managing the SRU and startup/shutdown sequences.
23	DHT	Seal Flush	P-804A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
24	DHT	Seal Flush	P-803A/B	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
25	DHT	V-801 DHT Feed Drum	PV-0214B	Process Control Valve	Process upset gas only.	The DHT Feed Drum, V-801, will not normally flare as expected operation will require natural gas makeup. V-801 is only expected to flare during upset conditions. No reduction is possible at this time.
26	DHT	V-801	PSV-0221	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
27	Crude		PSV-1913	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
28	Crude		PSV-1914	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
29	Crude	K-101-V-1	PSV-2031	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
30	DHT	F-801A	PSV-0111	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
31	DHT	F-801B	PSV-0112	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
32	DHT	T-801	PSV-1214	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
33	DHT	V-802 DHT High Pressure Separator	XV-0724	Solenoid Valve	Process upset gas only.	This valve is only for emergency depressuring and there will not be flaring during non-emergency operations. No reduction is possible.
34	DHT	V-802	PSV-0708	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
35	NSU	PK-501-E-1	PSV-0525	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
36	NSU	PK-501-V-1B	PSV-0528	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
37	NSU	PK-501-V-1A	PSV-0509	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
38	NSU	Seal Pots	P-501A/B & P-502	Pump	Process upset gas only.	Pump seal pots will flare only when there is a seal leak. Leaks are prevented, to the extent possible, by conducting routine maintenance. Leaks are detected by pressure indicators combined with flow orifices. Pumps are paired in order to allow online maintenance should leaks develop.
39	NSU	T-501	PSV-0125	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
40	NSU	V-501 Stabilizer Overhead Accumulator	PV-0237	Process Control Valve	Process upset gas only.	This valve is normally closed and will only be used for deinventory of the vessel during shutdown. No reduction is possible.
41	NSU	T-501	PSV-0115	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
42	ARU	V-1201	PSV-0115	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
43	NSU	V-503A	PSV-0403	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
44	NSU	V-503B	PSV-0404	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
45	ARU	V-2420	PSV-3110	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
46	ARU	V-2420 Amine Sump Drain	PV-3105A	Process Control Valve	Process upset gas only.	The Amine Sump, V-2420, will normally operate at lower pressure than the flare header which will prevent flaring. It is expected to only flare during upsets. No reduction is possible at this time.
47	Sour Water	V-1101	PSV-0131	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
48	Sour Water	V-1102 SWS Reflux Drum	PV-0305	Process Control Valve	Process upset gas only.	The Sour Water Stripper Reflux Drum, V-1102, will normally have 100% reflux and not vent to the flare. It would only flare under upset conditions when the Sour Water Stripper overheats. No reduction is possible at this time.
49	Sour Water	T-1101	PSV-0229	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
50	Utilities	Natural Gas Header	FV-2720	Sweep Gas	Sweep gas at approximately 500 scfh.	The natural gas sweeps have been minimized per API 521. This is one of seven sweeps. The others are manually set per procedure using rotometers. FV-2720 provides sweep gas for the main flare header and will be controlled automatically to sustain minimum sweep rates for the flare header and to prevent oxygen infiltration into the flare stack. During flaring events, FV-2720 will reduce the flow of natural gas to the flare header. No further reduction is possible.
51	NSU	V-503B	PSV-0404	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
52	Fuel Gas	V-2403	PSV-1902	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
53	Fuel Gas	V-2403, Fuel Gas Mix Drum	PV-1903A	Process Control Valve	Process upset gas only.	The fuel gas system will normally require approximately 50% natural gas supplementation. The only anticipated scenarios when the refinery may need to flare from the fuel gas system are during power outages and during startup. The details of the startup scenario, when hydrogen may need to be vented to the flare, are described in Section 6 of the Flare Management Plan.
54	Fuel Gas	Natural Gas Header	PSV-1916	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
55	DHT	T-803	PV-0731	Process Control Valve	Process upset gas only.	If the HGU produces more hydrogen than can be utilized, the excess will be flared via this connection. This flaring is anticipated during upset conditions and during startup as described in Section 6 of the Flare Management Plan.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
56	DHT	V-805 DHT Recycle Compressor Suction Drum	V-805	NNF (Normally No Flow)	Process upset gas only.	This connection will only be utilized in the infrequent event that there is liquid accumulation in the DHT Recycle Compressor Suction Drum, V-805. Liquid accumulation is not anticipated under normal operation and is expected only during upset conditions. No reduction is possible at this time.
57	DHT	K-801A/B	K-801A/B	PSVs	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
58	DHT	V-804	PSV-1005	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
59	DHT	V-804 Make Up Hydrogen Compressor KO Pot	V-804 drain	NNF	Process upset gas only.	The Make Up Hydrogen Compressor KO Pot is utilized to protect the compressor. Liquid accumulation, which would necessitate flaring, is not anticipated except in upset conditions. No reduction is possible at this time.
60	DHT	Seal Pots	P-804A/B, P-803A/B, P-801A/B	Pump	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
61	Utilities	Natural Gas Header	FI-2705A	Sweep Gas	Sweep gas at approximately 20 scfh.	The flare sweep gas has been minimized per API 521. This is one of seven sweeps. Its flow is set manually by procedure using a rotometer. The flow for this connection will be 20 scfh.
62	HGU	Fuel Gas	PSV-1201	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
63	HGU	V-1905	PSV-1101	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
64	HGU	A-1901A/B/C/D/E	PSV-1113	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
65	HGU	A-1901A/B/C/D/E	PSV-1114	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
66	HGU	V-1905 HGU Vent Gas Drum	PV-1102	Process Control Valve	Process upset gas only.	This vent is for emergency use only and will not contribute to the flare during non-emergency operations. No reduction is possible at this time.
67	Utilities	Natural Gas	FI-2701A	Sweep Gas	Sweep gas at approximately 100 scfh.	The flare sweep gas has been minimized per API 521. This is one of seven sweeps. Its flow is set manually by procedure using a rotometer. The flow for this connection will be 100 scfh.
68	HGU	OSBL	PSV-0426	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
69	HGU	K-1903	PSV-0306	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
70	HGU	A-1902	PSV-0401	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
71	HGU	R-1903	R-1903	Manual	Process upset gas only.	This connection is used only for final deinventory of the reactor during shutdown. It will not contribute to the flare during normal operations and, during shutdown, the reactor will be deinventoried to the process until low pressure necessitates venting to the flare. No reduction is possible at this time.
72	HGU	V-1904	PSV-0809	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
73	HGU	V-1901	PSV-0111	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
74	HGU	V-1910	PSV-0405	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
75	HGU	K-1904	PSV-1507	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
76	HGU	K-1904	PSV-1508	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
77	HGU	K-1904	K-1904	Manual	Process upset gas only.	This connection will only be utilized for final deinventory and inerting of the compressor. It will not be used during normal operation. No reduction is possible at this time.
78	HGU	V-1911	V-1911	Manual	Process upset gas only.	This vessel will not normally have any liquid accumulation, which would necessitate draining to the flare, as it will contain only very light material. In the event of a process upset or emergency shutdown, a small amount of liquid may accumulate. No reduction is possible at this time.
79	HGU	Hydrogen Analyzer Calibration Gas	AT-1604	Analyzer Calibration Gas Vent	Process upset gas only.	This connection is required to flare a very small amount of analyzer calibration gas. It will be a minimal flare contributor. No reduction is possible.
80	HGU	A-1902 - HGU Feed Compressor	A-1902 Carbon Bed	Manual	Process upset gas only.	This connection is used only for final depressuring of the vessel during shutdown. No reduction is possible.
81	HGU	K-1903	PSV-0303	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
82	HGU	V-1904	PSV-1011A	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
83	HGU	A-1901A/B/C/D/E	PV-1001A	Process Control Valve	Process upset gas only.	This connection is used, in conjunction with PSVs, to provide overpressure protection. It will not be used in normal operation for pressure control and will flare only during upset conditions. No reduction is possible at this time.
84	HGU	V-1904	PSV-1011B	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

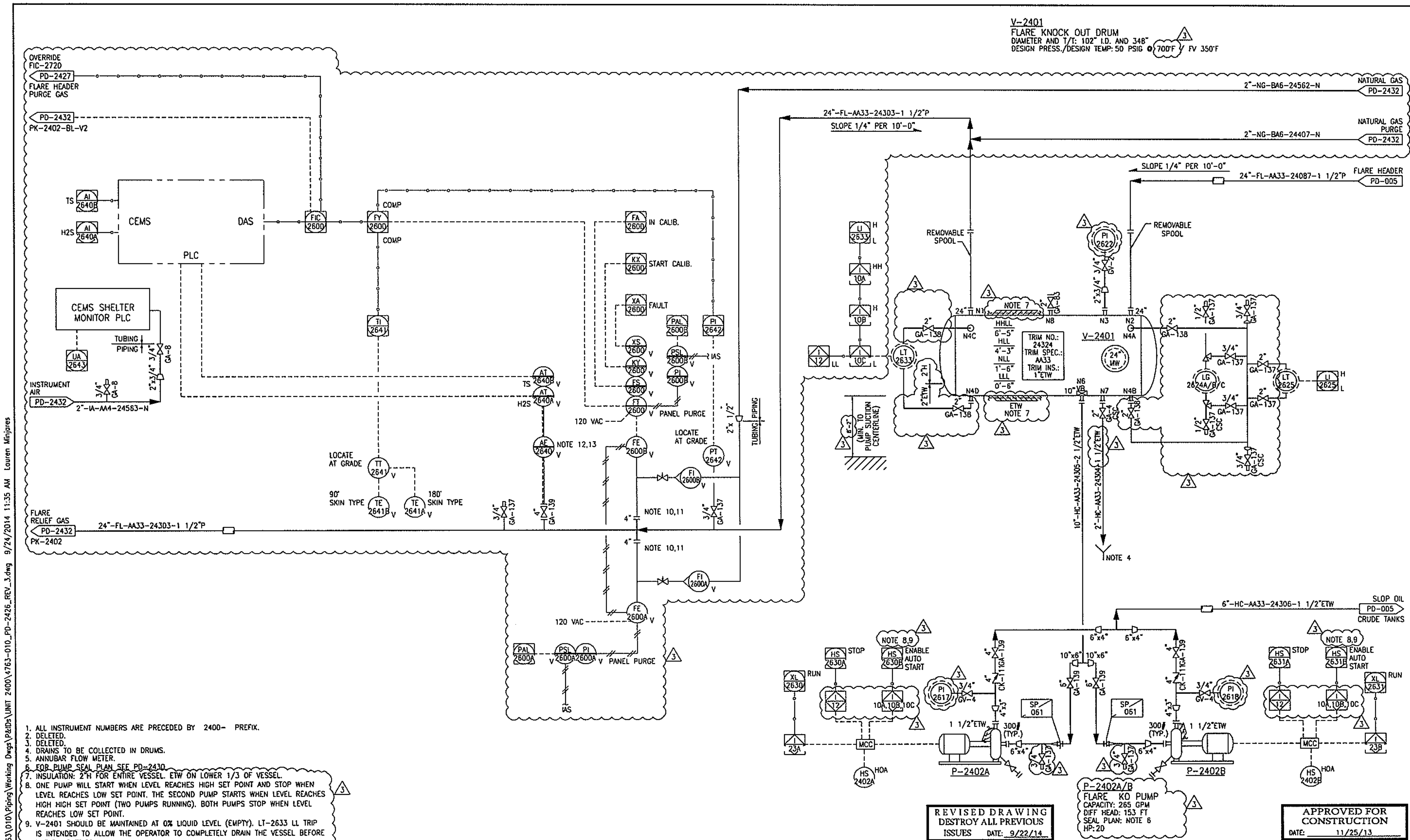
Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
85	HGU	V-1904 - HGU Cold Condensate Separator	PV-1016	Process Control Valve	Process upset gas only.	This valve provides initial over-pressure protection for the line feeding the PSA (pressure swing adsorption) vessels. It may be needed on occasion due to the complexity of the PSA network, but operations will be optimized through procedures, automation, and maintenance to minimize its use. No reduction is possible at this time though the system will be monitored after startup for potential flare reductions.
86	HGU	V-1904	PSV-1011C	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
87	HGU	V-1904	PSV-1011D	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
88	HGU	V-1904	PSV-1011E	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
89	Utilities	Natural Gas	FI-2702A	Sweep Gas	Sweep gas at approximately 20 scfh.	The flare sweep gas has been minimized per API 521. This is one of seven sweeps. Its flow is set manually by procedure using a rotometer. The flow for this connection will be 20 scfh.
90	Utilities	Natural Gas	FI-2703A	Sweep Gas	Sweep gas at approximately 20 scfh.	The flare sweep gas has been minimized per API 521. This is one of seven sweeps. Its flow is set manually by procedure using a rotometer. The flow for this connection will be 20 scfh.
91	Utilities	V-2422	PSV-3305	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
92	Utilities	V-2422	PSV-3304	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
93	SRU	Natural Gas	FI-2003	Sweep Gas	Sweep gas at approximately 20 scfh.	The flare sweep gas has been minimized per API 521. This is one of seven sweeps. Its flow is set manually by procedure using a rotometer. The flow for this connection will be 20 scfh.
94	SRU	Amine Gas Vent	PSV-0101	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

DPR Flare Connection List and Minimization Assessment

Connection Number	Process Unit	Source	Vent	Vent Type	Anticipated Flare Contribution	Minimization Evaluation (Considering CAPEX/OPEX, Technical Feasibility, Secondary Environmental Impacts, or Reduction Not Possible)
95	SRU	P-1301 (Amine Acid Gas KO Pump)	SG-0111	Pump	Process upset gas only.	This connection will only be used in the event of pump seal malfunction. Any flare contribution would quickly be addressed. Though this pump does not have a redundant twin, its infrequent service will allow for maintenance in the event of malfunction. No reduction is possible at this time.
96	SRU	SWS Acid Gas	PSV-0201	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
97	SRU	P-1302 (Sour Water Acid Gas KO Pump)	SG-0210	Pump	Process upset gas only.	This connection will only be used in the event of pump seal malfunction. Any flare contribution would quickly be addressed. Though this pump does not have a redundant twin, its infrequent service will allow for maintenance in the event of malfunction. No reduction is possible at this time.
98	SRU	E-1305 Quench Cooler/ Condenser	PSV-1301	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.
99	SRU	T-1302 Fuel Gas Contactor	PSV-1701	PSV	Process upset gas only.	PSVs are designed to lift only under emergency circumstances. Any PSV lift will be reviewed and, if possible, operational changes will be made to prevent the circumstances leading to the lift and resulting flaring. Leaking PSVs will be prevented to the extent possible. PSVs will be evaluated using ultrasonic monitoring.

Appendix C

Flare Diagrams



1. ALL INSTRUMENT NUMBERS ARE PRECEDED BY 2400- PREFIX.
2. DELETED.
3. DELETED.
4. DRAINS TO BE COLLECTED IN DRUMS.
5. ANNUBAR FLOW METER.
6. FOR PUMP SEAL PLAN SEE PD-2430.
7. INSULATION: 2"H FOR ENTIRE VESSEL. ETW ON LOWER 1/3 OF VESSEL.
8. ONE PUMP WILL START WHEN LEVEL REACHES HIGH SET POINT AND STOP WHEN LEVEL REACHES LOW SET POINT. THE SECOND PUMP STARTS WHEN LEVEL REACHES HIGH HIGH SET POINT (TWO PUMPS RUNNING). BOTH PUMPS STOP WHEN LEVEL REACHES LOW SET POINT.
9. V-2401 SHOULD BE MAINTAINED AT 0% LIQUID LEVEL (EMPTY). LT-2633 LL TRIP IS INTENDED TO ALLOW THE OPERATOR TO COMPLETELY DRAIN THE VESSEL BEFORE THE PUMP TRIPS.

NOTES:
10. MOUNT HORIZONTALLY IN PIPE.
11. MINIMUM DISTANCE UPSTREAM AND DOWNSTREAM FROM ANY BENDS OR PROTRUSIONS IS 5' AND 3' RESPECTIVELY AND 16' DOWNSTREAM NG PURGE LINE.
12. VENDOR SUPPLIED IMPULSE TUBING, HEAT TRACED. INSTALL 45' FROM HORIZONTAL.
13. MINIMUM DISTANCE UPSTREAM FROM ANY BENDS OR PROTRUSIONS IS 16'.

REVISED DRAWING DESTROY ALL PREVIOUS ISSUES DATE: 9/22/14

APPROVED FOR CONSTRUCTION DATE: 11/25/13

REVISION DESCRIPTION AREA

NO.	BY	CHK.	APP.	DATE	DESCRIPTION
3	KM	RD	JC	9/22/14	REVISED AS NOTED
1	MJS	ME	BAE AM	4/23/14	REVISED AS NOTED
2	JA	ME	BAE AM	5/19/14	REVISED AS NOTED

	SIGNATURE	DATE
DRAWN	BC	4/3/13
CHECKED	SK	11/25/13
APPROVED	AM	11/25/13
APPROVED	JMB	11/25/13
APPROVED		

DAKOTA PRAIRIE REFINING, LLC
DICKINSON, ND

SCALE: NONE

VENTECH ENGINEERS NORTH AMERICA LLC
PASADENA, TEXAS 77502 P.O. BOX 4261

20,000 BPSD DAKOTA PRAIRIE REFINERY
FLARE SYSTEM KO DRUM
PIPING & INSTRUMENT DIAGRAM

JOB NUMBER: 4763-010 DRAWING NUMBER: PD-2426 REV.: 3

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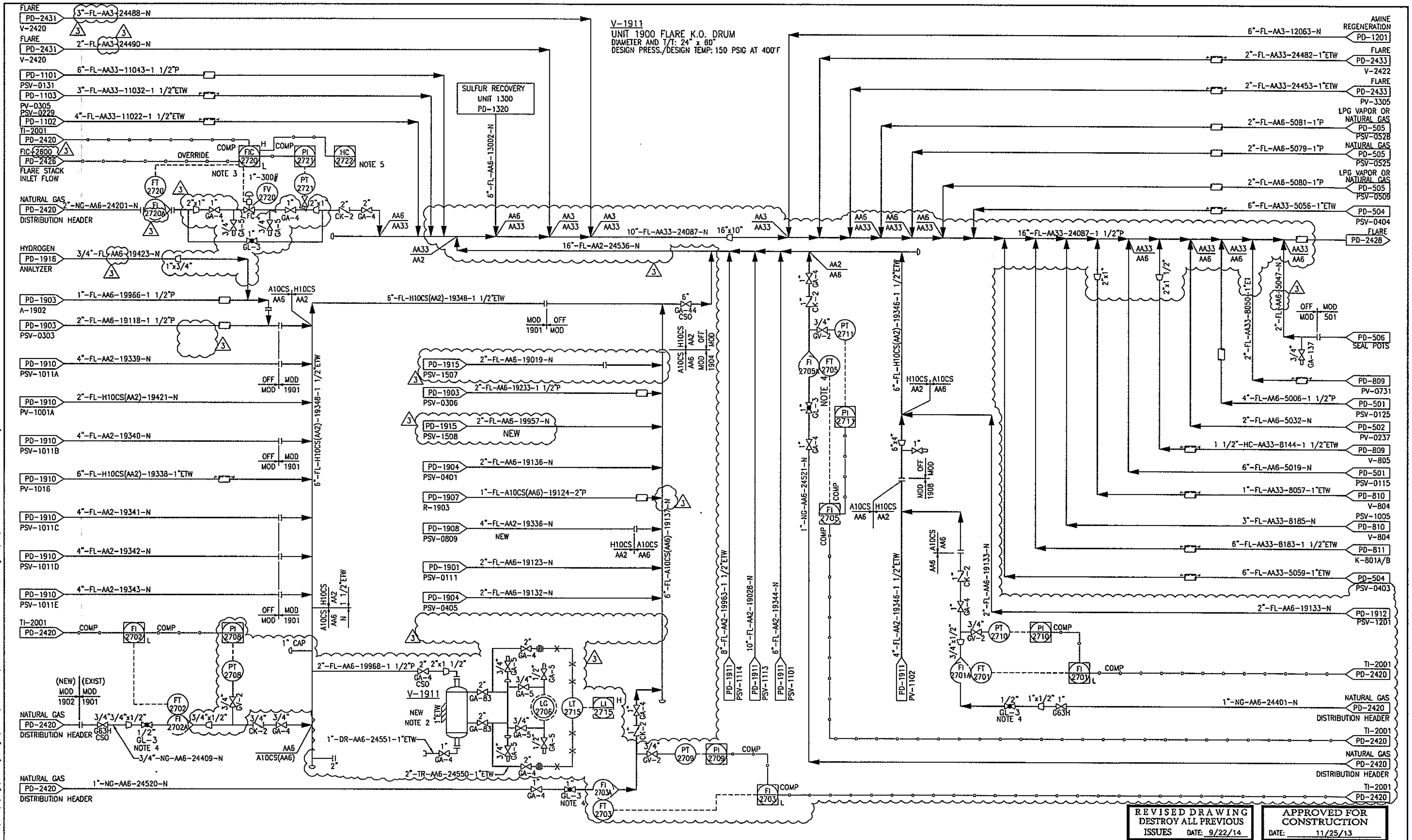

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NOTES:
1. ALL INSTRUMENT NUMBERS ARE PRECEDED BY 2400- PREFIX.
2. V-1911 IS LOCATED IN UNIT 1900. ETW BOTTOM 1/3 OF V-1911.
3. PURGE GAS (NATURAL GAS) MINIMUM REQU. IS 434 SCFH (21.3LB/HR) PER FLARE INDUSTRIES. SET TRAVEL STOP ON FV-2720 TO ASSURE MIN. FLOW.
4. ROTAMETER TO BE VISIBLE FROM GLOBE VALVE LOCATION.
5. PRIORITY MANUAL SET POINT TO BE OVERRIDDEN WHEN A LARGE FLOW IS DETECTED IN FIC-2616 (RELEASE EVENT).

REVISION DESCRIPTION AREA

NO.	BY	CHK.	APP.	DATE	DESCRIPTION
3	KU	RO	JC	9/22/14	REVISED AS NOTED
1	CES	ME	BAE / AM	4/23/14	REVISED AS NOTED
2	MG	ME	BAE / AM	5/19/14	REVISED AS NOTED

	SIGNATURE	DATE
DRAWN	BC	4/3/13
CHECKED	SK	11/25/13
APPROVED	AM	11/25/13
APPROVED	JMB	11/25/13
APPROVED		

DAKOTA PRAIRIE REFINING, LLC
DICKINSON, ND

REVISION DESCRIPTION: A = PRELIMINARY, B = CLIENT APPROVAL, C = APPROVED FOR DESIGN, 0 = APPROVED FOR CONSTRUCTION

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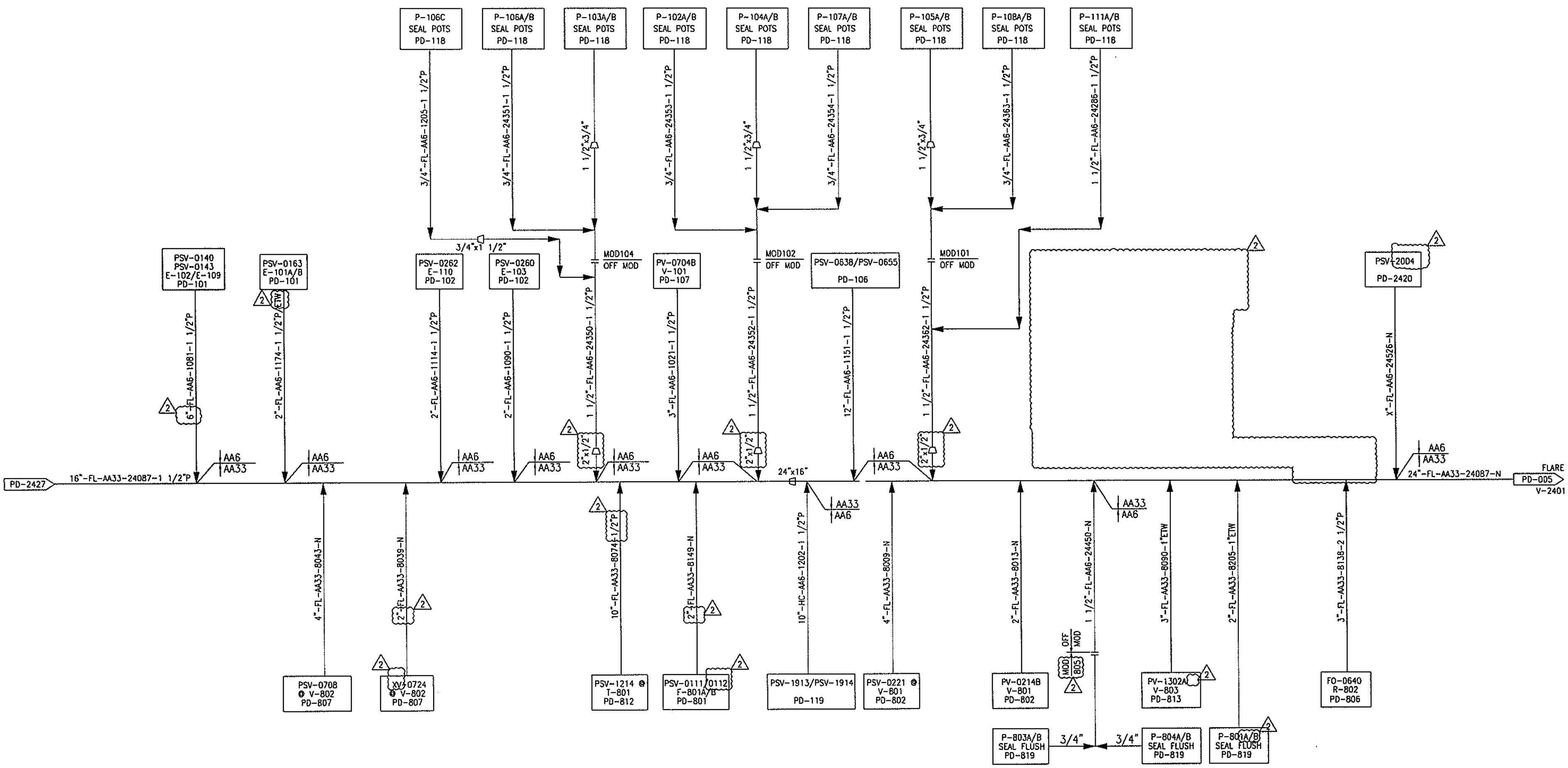
20,000 BPSD DAKOTA PRAIRIE REFINERY
FLARE HEADER SHT. 1
PIPING & INSTRUMENT DIAGRAM

JOB NUMBER: 4763-010 | DRAWING NUMBER: PD-2427 | REV. 3



REVISED DRAWING DESTROY ALL PREVIOUS ISSUES DATE: 5/19/14

APPROVED FOR CONSTRUCTION DATE: 11/25/13

NOTES:

REVISION DESCRIPTION AREA					
NO.	BY	CHK.	APP.	DATE	DESCRIPTION
0	BC	SK	AM / JMB	11/25/13	APPROVED FOR CONSTRUCTION
1	WS	ME	BAE / AM	4/23/14	REVISED AS NOTED
2	MG	ME	BAE / AM	5/19/14	REVISED AS NOTED

	SIGNATURE	DATE
DRAWN	BC	4/3/13
CHECKED	SK	11/25/13
APPROVED	AM	11/25/13
APPROVED	JMB	11/25/13
APPROVED		

DAKOTA PRAIRIE REFINING, LLC
DICKINSON, ND

REVISION DESCRIPTION: A = PRELIMINARY, B = CLIENT APPROVAL, C = APPROVED FOR DESIGN, 0 = APPROVED FOR CONSTRUCTION

SCALE: NONE

VENTECH ENGINEERS NORTH AMERICA LLC
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20,000 BPSD DAKOTA PRAIRIE REFINERY
FLARE HEADER SHT. 2
PIPING & INSTRUMENT DIAGRAM

JOB NUMBER	DRAWING NUMBER	REV.
4763-010	PD-2428	2

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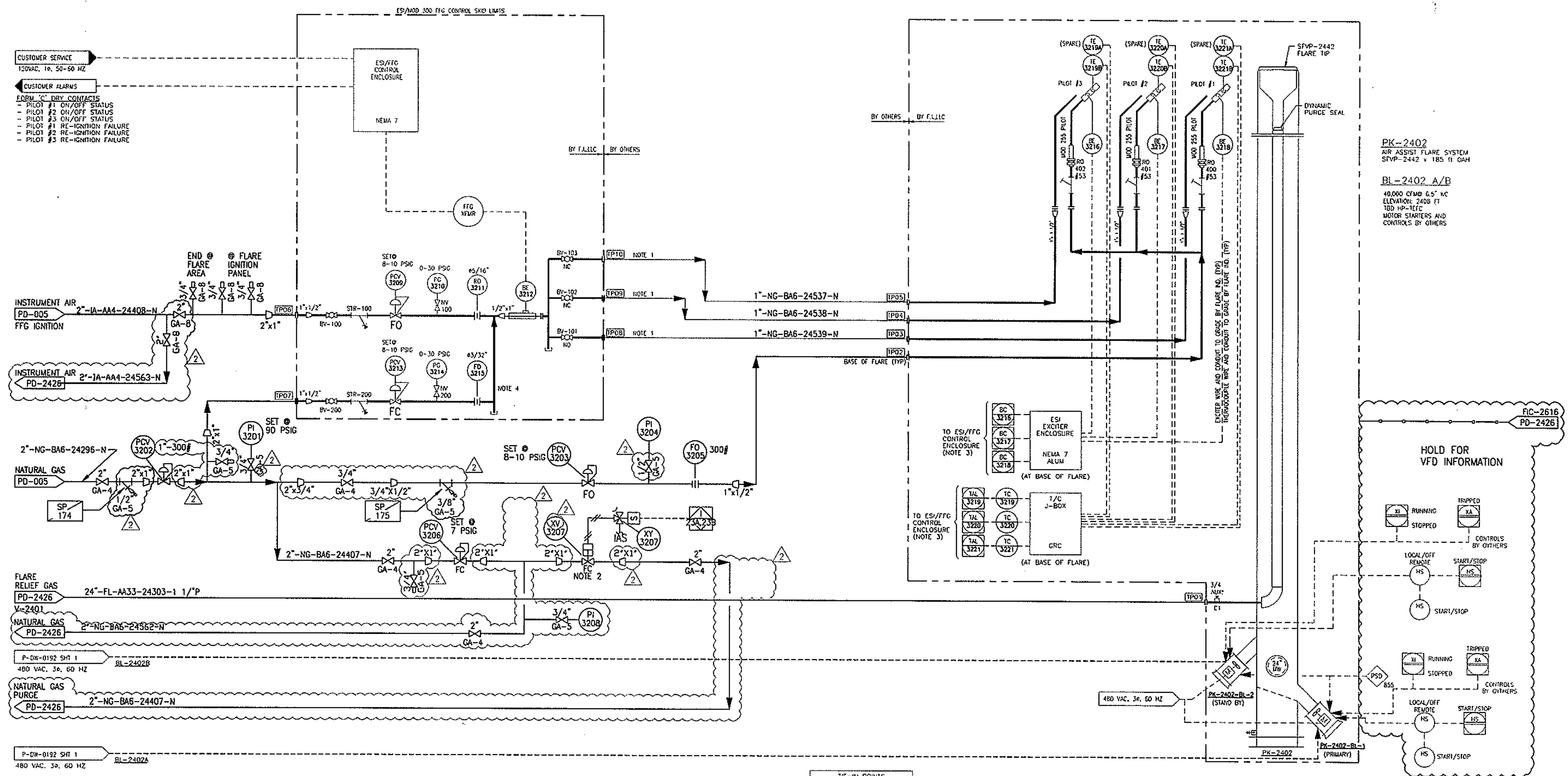

NOTES:

1. IGNITION PIPE BETWEEN FLAME FRONT GENERATOR AND PILOT TO BE 1"-SCH 80. ANY LOW POINTS TO BE EQUIPPED WITH ACCESSIBLE DRAIN. NO RESTRICTIONS (VALVES ETC) ALLOWED.
2. THE STATED PURGE RATE IS CALCULATED BASED ON API RECOMMENDED VELOCITIES TO PREVENT AIR INGRESS ONLY. HIGHER PURGE RATES MAY BE REQUIRED TO PREVENT FLAME BURN BACK. PURGE GAS (NATURAL GAS) REQUIREMENT IS 5,375 SCFH WHEN 2 PUMPS ARE RUNNING (PLUS 434 SCFH ADDED TO MAIN HEADER PER FLARE INDUSTRIES)
3. INTERCONNECTING WIRE AND CONDUIT FROM BASE OF FLARE TO ESI/MOD 300 FFG CONTROL ENCLOSURE IS BY OTHERS.
4. ALL COMPONETS ON FFG TO BE CARBON STEEL THD. WITH CARBON STEEL OR ALUM. BODY VALVES, THD.
5. ALL INSTRUMENT TAG NUMBERS ARE PRECEDED BY 2400 PREFIX.

TIE-IN POINTS

ITEM	SIZE	RATING	TYPE
TP01	24"	150#	RF
TP02	1"	150#	RF
TP03	1"	150#	RF
TP04	1"	150#	RF
TP05	1"	150#	RF
TP06	1"	150#	RF
TP07	1"	150#	RF
TP08	1"	150#	RF
TP09	1"	150#	RF
TP10	1"	150#	RF

	DATE	REVISIONS	BY	CH'K	APPR.
A	12/13/13	ISSUED FOR APPROVAL	PFB	TAE	FB

VENTECH ENGINEERS
CALUMET COLD FLARE, NORTH DAKOTA, USA
PO# 4763010-13-02838 PROJECT #4763-010

PIPING & INSTRUMENTATION DIAGRAM
SFVP-2442 FLARE SYSTEM
w/ MOD 255 PILOTS
& ESI / MOD 300 FFG

FLARE INDUSTRIES — INNOVATIVE COMBUSTION SOLUTIONS

SCALE: NTS — FLARE PROJECT NO: 130741 — SHEET: 1 of 1 — DRAWING NUMBER: 130741-A-P01 — REV: A

REVISED DRAWING
DESTROY ALL PREVIOUS ISSUES DATE: 9/22/14

APPROVED FOR CONSTRUCTION
DATE: 4/23/14

NOTES:

REVISION DESCRIPTION AREA

NO.	BY	CHK.	APP.	DATE	DESCRIPTION
0	CES	HE	BAE / AM	4/23/14	APPROVED FOR CONSTRUCTION
1	RCK	HE	BAE / AM	5/19/14	REVISED AS NOTED
2	HG	RD	JC	9/22/14	REVISED AS NOTED

	SIGNATURE	DATE
DRAWN		
CHECKED	HE	4/23/14
APPROVED	BAE	4/23/14
APPROVED	AM	4/23/14
APPROVED		

DAKOTA PRAIRIE REFINING, LLC
DICKINSON, ND

SCALE: NONE

VENTECH ENGINEERS NORTH AMERICA LLC
PASADENA, TEXAS 77502 P.O. BOX 4261

20,000 BPSD DAKOTA PRAIRIE REFINERY
FLARE SYSTEM
PIPING & INSTRUMENT DIAGRAM

JOB NUMBER: 4763-010 — DRAWING NUMBER: PD-2432 — REV. 2

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